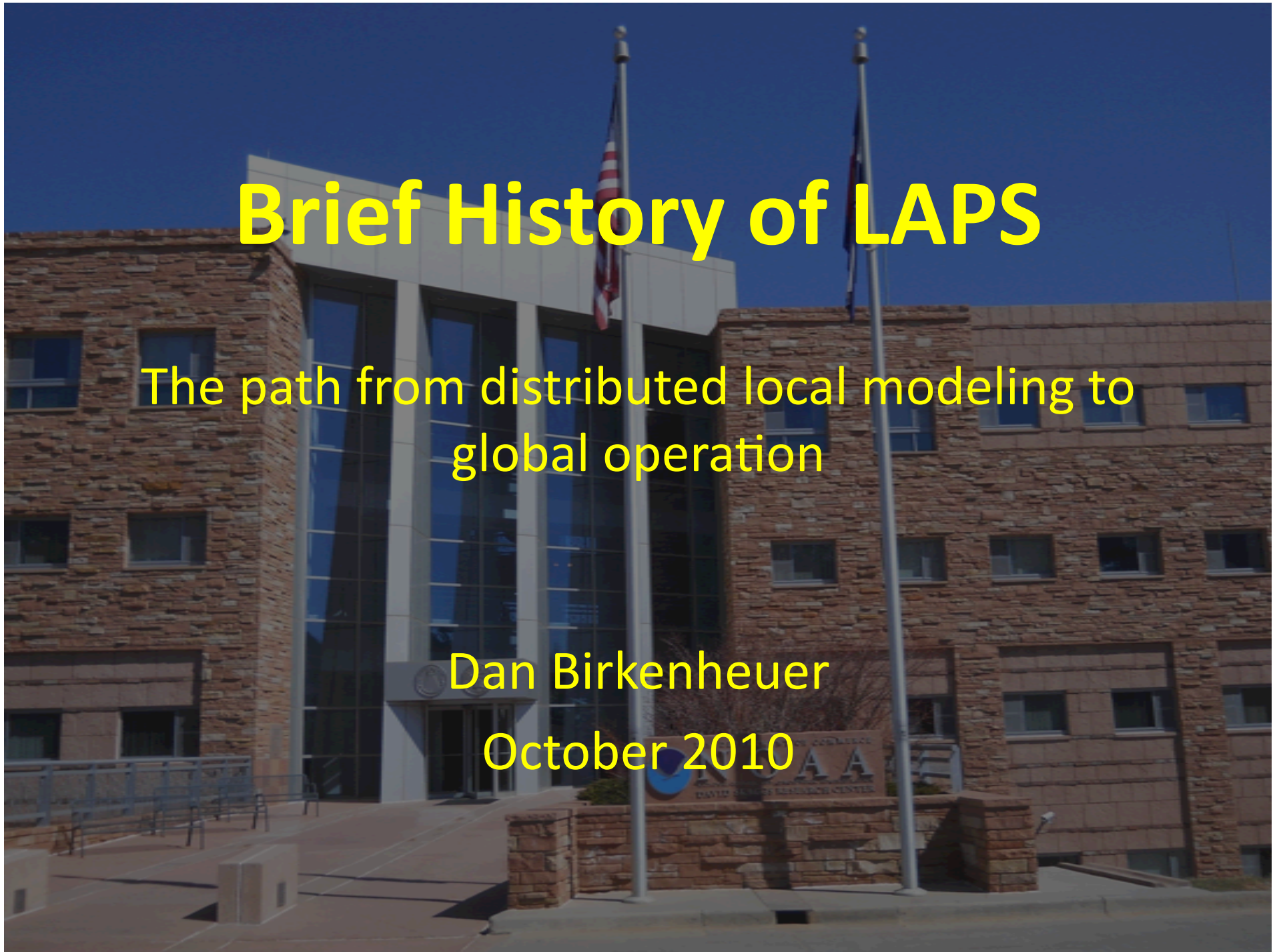


Brief History of LAPS

The path from distributed local modeling to
global operation

Dan Birkenheuer

October 2010

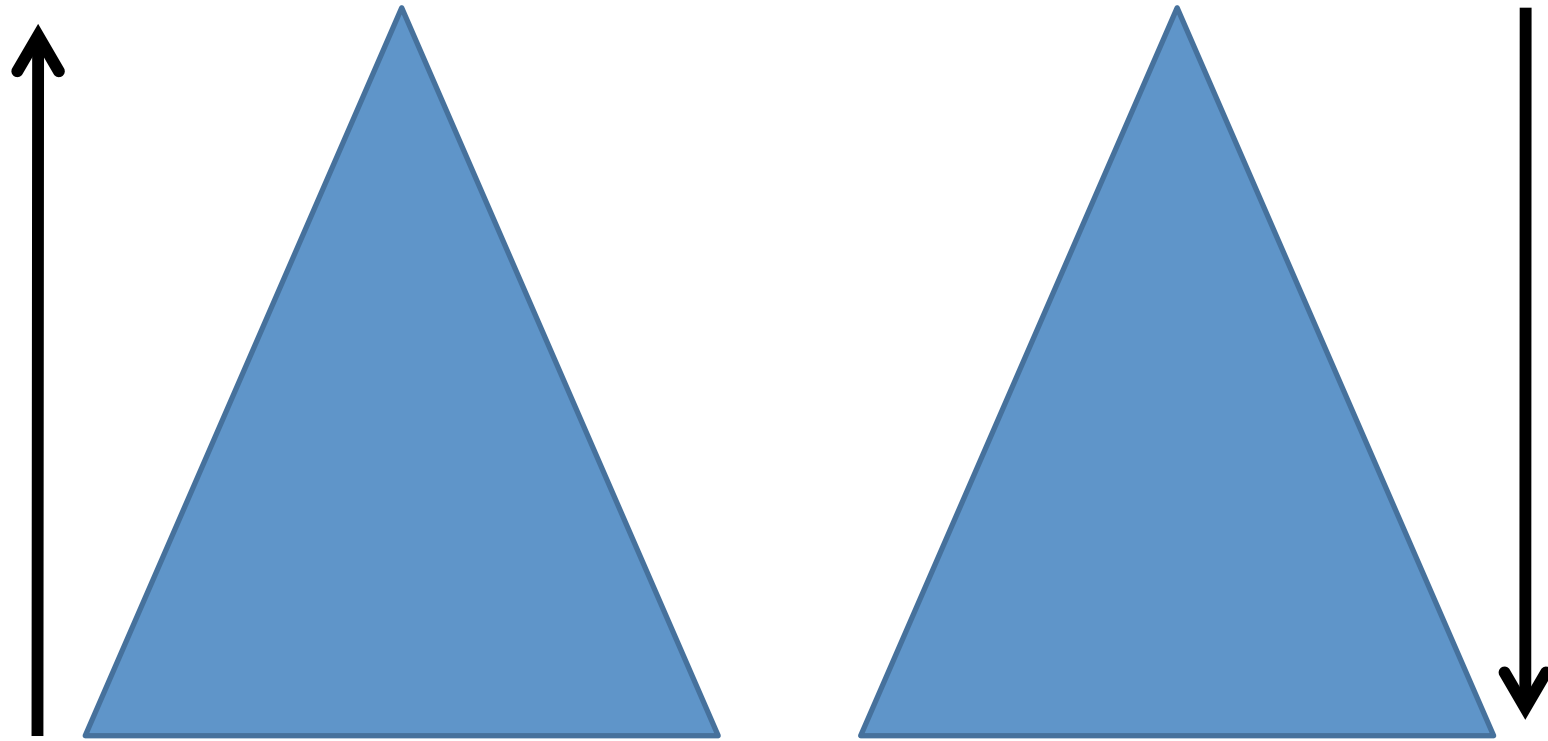


Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history
- Personnel and their legacy
- Constraints
- Goals

Overview

- Conception – design – local forecast office
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history
- Personnel and their legacy
- Constraints
- Goals



We had a choice, bottom up or top down.
We chose bottom up.

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
 - CWB, KMA, FMI, Forest Service, Universities, Users!, DoD, DoT, private sector, international involvement, state/local governments, NOAA....

THANKS !

- Domain history
- Modeling history
- Personnel and their legacy
- Constraints
- Goals

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history – gee any more than **61x61**?
- Modeling history
- Personnel and their legacy
- Constraints
- Goals

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history – started in the early 90s
RAMS, MM5, WRF
- Personnel and their legacy
- Constraints
- Goals

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history
- Personnel and their legacy – a long list!
- Constraints
- Goals

Players over the years

- John McGinley
- Steve Albers (u,v,w,t +)
- Pete Stamus (sfc)
- John Smart (lsm, sat)
- Dan Birkenheuer (q, sat)
- Jim Edwards (make)
- Seth Gutman (gps, qc)
- Kirk Holub (gps)
- Craig Tremback
- Paul Schultz (cld vv, +)
- Mark Jackson (radar)
- John Snook (models)
- Isidora Jankov (wrf)
- Linda Wharton
- Paula McCaslin (AVS +)
- Ed Szoke
- CWB team
- KMA visitors

Players over the years cont.

- Brent Shaw (models)
- Steve Early
- Eric Gregow
- Craig Hartsough
- Jennifer Cram
- FIELD USERS
 - Pablo Santos
 - Matt Foster
 - DEN FO
- Ok Yeon Kim (Covar)
- Jerry Schmidt
- Timothy Hume (NZ)
- Tomi V
- Zoltan Toth
- Brad Beechler
- Scott Macaro
- Wesley Smith
- Students

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history
- Personnel and their legacy
- Constraints – CPU, now disk space (1km 15min)
- Goals

Overview

- Conception - design
- Alliances, collaborative work, outside sponsors
- Domain history
- Modeling history
- Personnel and their legacy
- Constraints
- Goals – Something happened, we went global
 - And we now are becoming unified in 4dvar/enkf

Some LAPS Milestones

1989 - Wind Analysis Developed, Radar remapping of V,Z

1991 - Cloud Analysis / hot start developed and tested in the WISP experiment (with NCAR)

1992 - T-LAPS installed at 40 ITWS sites using Doppler Winds

2-km resolution every 5-min by 1998

Compare with national 2-km by ~2013

2000s - Cloud analysis / hot start elements incorporated into RUC running at NCEP

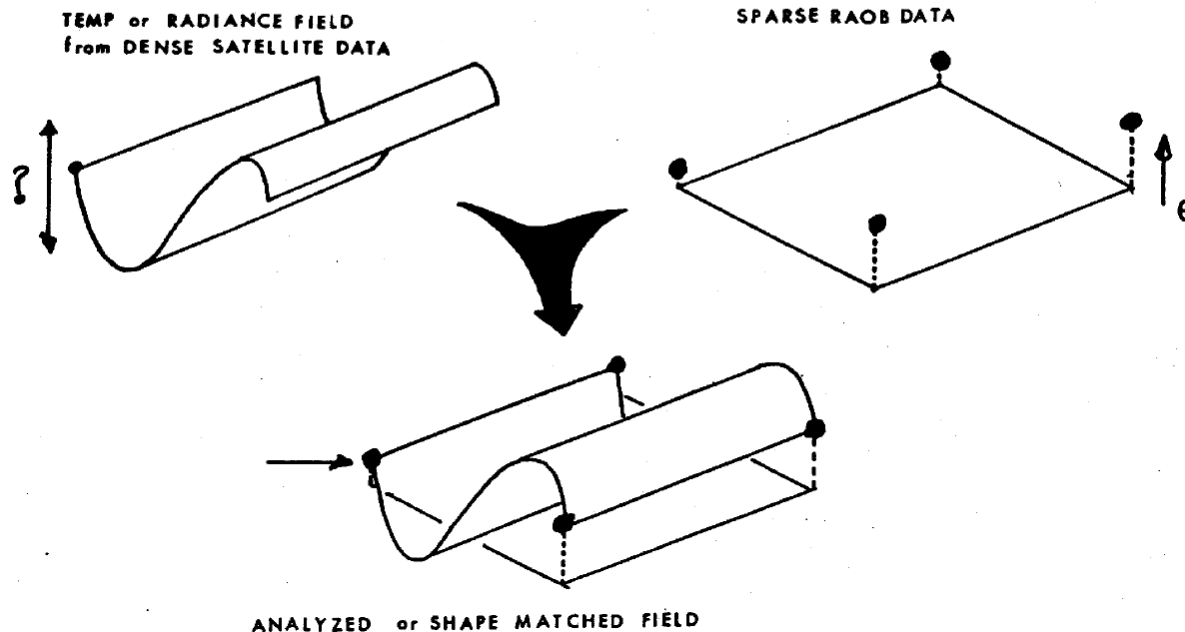
2006 - STMAS surface analysis developed & tested at MIT/LL for CoSPA

2009 - STMAS 3-D analysis developed

STMAS (state vars + clouds) → GSI → HRRR in future?

**Some of the popular viewgraphs
over the years**

HORIZONTAL SHAPE MATCHING

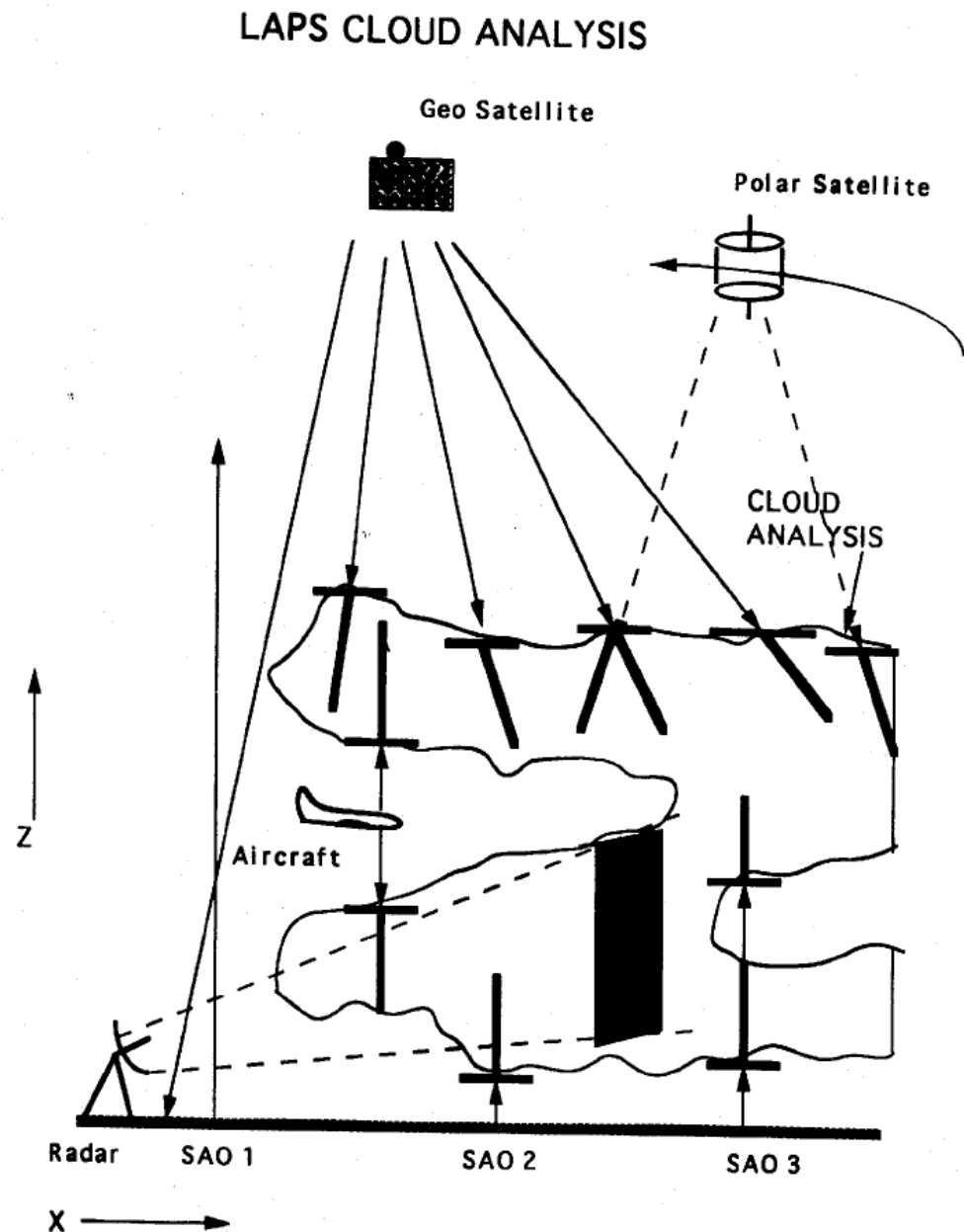


Likely the **most relevant viewgraph** related to gradient shape matching proposed and fostered by John McGinley in the early years of LAPS development.

The approach was later applied to satellite data in the early years, later removed for direct radiance assimilation and then reintroduced in the humidity analysis via gradient minimization.

**Actually scanned
in the sketch that
John McGinley
drew out and it
even appears
electronically in
some
presentations!**

Circa 1991?

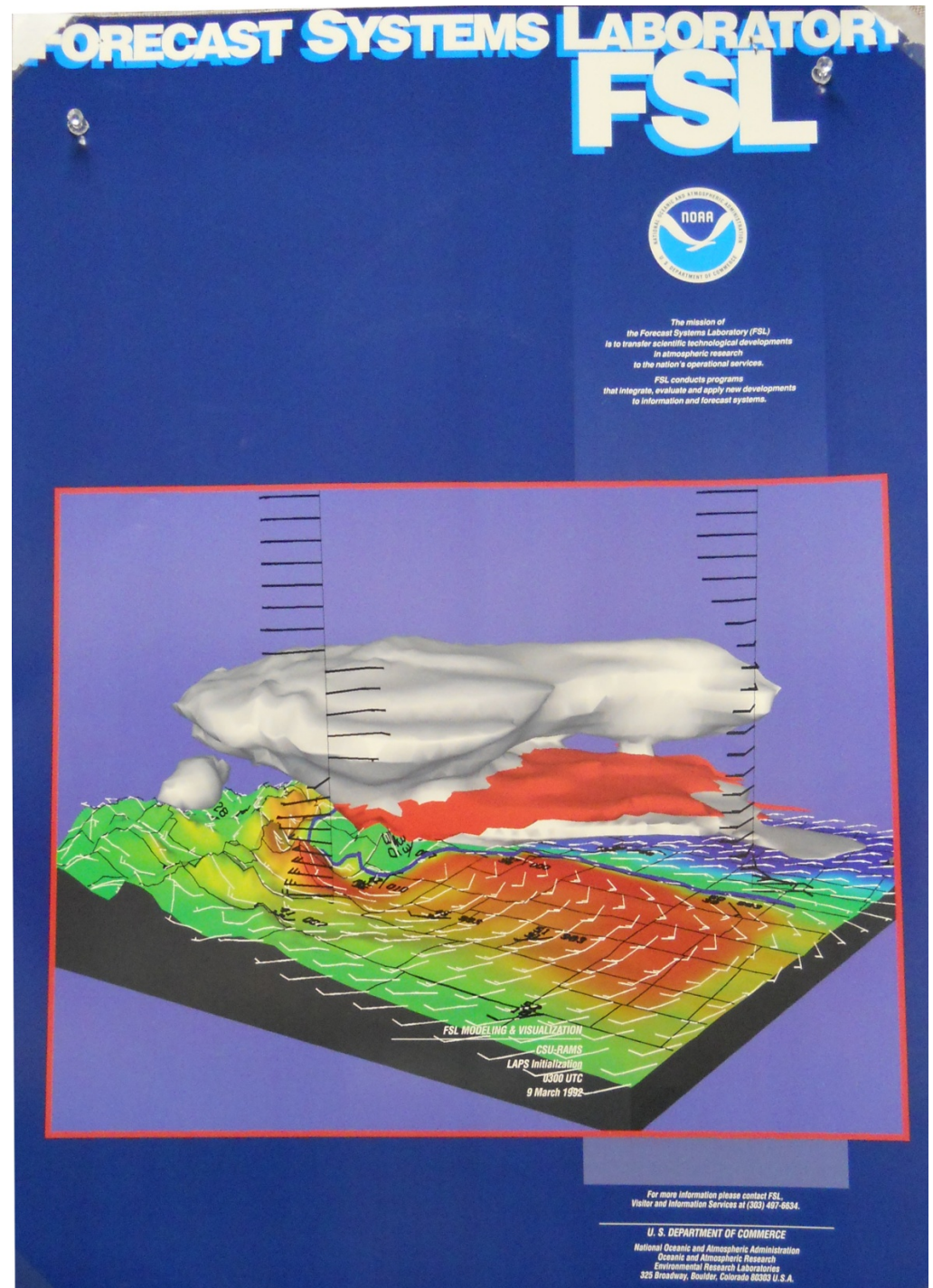


LAPS 3D AVS image

Made the covers of many things including poster (here)

Cover of “year in review” and several presentations and documents.

(this poster resides in Isidora’s office)



Local Analysis and Prediction System (LAPS)

Daniel Birkenheuer (303) 497-5584 birk@fsl.noaa.gov



- Purpose



- Scale (domain and time factors)



- Data Sources



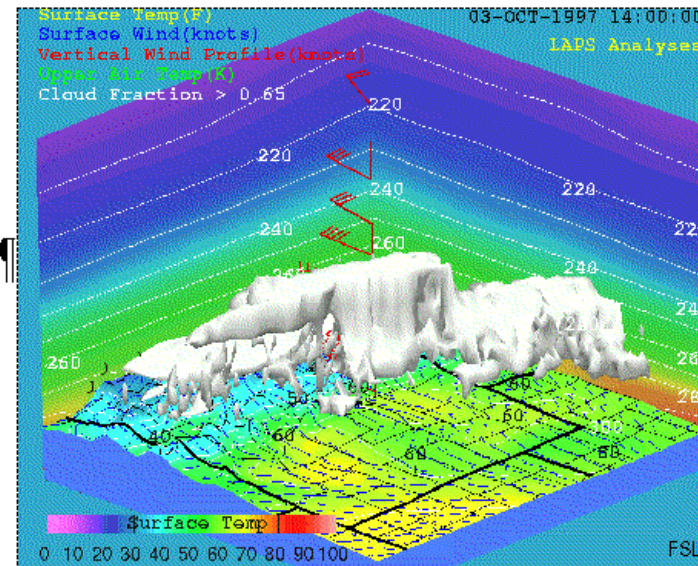
- Products (model initialization)



- Examples



<http://laps.fsl.noaa.gov/frd-bin/LAPB.homepage.cgi>



October 3, 1997

CIRCA 1997 – early rendition of the 3-d field posted on the web and looped using AVS! and other tools. Introduced first looping 3D image on the LAPS website.

Similar images became images for covers on such publications as FSL in Review.

LAPS A system designed to:

- > Exploit all available data sources (**local** and **global**)¶
- > Create analyzed and forecast grids¶
- > Build products for **specific** forecast applications¶
- > Initialize local-scale model to address local needs¶
- > Use **advanced** display technology¶
- >All within the local weather office¶

§

One of the original slides we used to highlight the purpose that we used to create LAPS. The forecast office was the initial focus and is now one of several players and scales used for LAPS.

Another recount circa 1998 enumerating places and the heterogeneous OS that LAPS had been ported to. It is interesting to note that over the years the heterogeneity of this list is actually shrinking to a degree.

LAPS has been ported to:¶

- > MIT Lincoln Labs (Orlando, FL experiment) (**Sun**)¶
- > University of Oklahoma (VORTEX) (**IBM RS6000**)¶
- > Seattle, WA WSFO (**HP 755**)¶
- > Salt Lake City, UT WSFO (**HP 755**)¶
- > Atlanta, GA (Olympics) (**HP 755 / IBM SP2**)¶
- > Monterey, CA WSFO / UC Davis (**SGI**)¶
- > GTE (**Cray**)§

Now our focus is more on Intel, GPU, and parallel technology! And MORE compilers

A 1997 slide showing places where LAPS had been ported to.

Still an emphasis largely on the WFOs to be later overwhelmed by other outside users on a global scale.

LAPS Porting Activities¶

Projects¶

- > Air Force¶
- > Beijing¶
- > Atlanta (Olympics)¶
- > Kennedy and Vandenberg Space Flight Centers¶

AWIPS Build 4.0¶

NWS SOO Ports (via COMET)¶

- > Brownsville, TX¶
- > Las Vegas, NV¶
- > Lubbock, TX¶
- > Ruskin (Tampa), FL¶
- > San Juan, PR¶
- > Moorhead City, NC¶
- > Pueblo, CO¶
- > Aberdeen, SD§

Summary

- Where are we going? – hope to clarify now
 - Better system (STMAS)
 - Improved error description
 - Simultaneous solution
 - Eye to NCEP formats
 - WRF ties strengthening
 - Ensemble output
- When?
 - Realistically about 1 to 2 years (phase-in approach).
- What DON'T we want to do? – export buggy code – HOW? – Enhance our collaboration!